Fear of Coronavirus, Stress and Fear of Childbirth in Polish Pregnant Women During SARS-CoV-2 Pandemic

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Research Article

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2   **SARS-CoV-2 Pandemic**

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Abstract

Background: COVID-19 pandemic is the largest pandemic of aggressive coronavirus in the human population in the 21st century. The pandemic may have a negative emotional impact on pregnant women, causing fear and stress. Negative feelings during pregnancy affect the later fear of childbirth.

Objective: Out study aimed to determine the relationship between fear of COVID-19, stress and fear of childbirth. We assume that fear of COVID-19 will be a mediator of the relationship between perceived stress and fear of childbirth.

Methods: 262 Polish pregnant women participated in this study. Perceived Stress Scale (PSS-10), Fear of COVID-19 Scale (FOC-6), and Labour Anxiety Questionnaire (KLP II) were used in the study.

Results: There was a statistically significant, moderate, and positive relationship between perceived stress, fear of COVID-19, and fear of childbirth. Fear of COVID-19 was a statistically significant mediator in the relationship between perceived stress and fear of childbirth

Conclusions: The COVID-19 epidemic may have a negative emotional impact on pregnant women, causing fear, stress, and increased fear of childbirth. Childbirth during the COVID-19 pandemic is perceived by women as a threat to their well-being and health. Therefore, it is especially important to support a woman in the perinatal period and to enable her to give birth to a companion.

Introduction

Pregnancy is a time of many changes in the woman's life. It may be associated with significant emotional stress, which may affect up to 75% of women [1]. Pregnant women are concerned about their health and their unborn child's health. Negative life events such as the outbreak of a contagious disease can also be the cause of stress. Pandemic brings uncertainty, numerous restrictions and changes, and a significant number of stressors [2].

The current COVID-19 pandemic caused by coronavirus SARS-CoV-2 is the largest pandemic of aggressive coronavirus in the human population in the 21st century. The clinical course of the COVID-19 disease varies from mild or even asymptomatic to severe respiratory failure and death [3]. From the current evidence base, it is not possible to conclusively state that pregnant women are at increased risk of severe consequences of COVID-19. Most women will experience mild or asymptomatic disease, but some may require mechanical ventilation and intensive care therapy [4]. In previous SARS-CoV and MERS-CoV coronavirus outbreaks, significant rates of maternal complications, including intensive care admissions, need for mechanical ventilation, and deaths have been observed [5]. This may have exacerbated fear in pregnant women during the COVID-19 outbreak.

While COVID-19 is not associated with a significant risk of severe disease in pregnant women, the same cannot be said for its psychological effects [6]. Pregnant women feel stress, fear, and anxiety during the global pandemic that caused the death of more than 3 million people worldwide. As a result of the rapidly increasing number of cases and deaths, both at-risk individuals and society as a whole, experience psychological distress and other mental health problems [7-10]. Increased responses to stress during and immediately after a serious life event are associated with adverse effects on physical and mental health, which is particularly important for pregnant women.

67   The presence of contagious diseases contributes to the increase of fear in society, as has

68   already been demonstrated in previous epidemics [11,12]. There was a fear of getting infected,

69   of dying and losing a loved one, and of contact with people who might be infected [13,14]. The

70   COVID-19 pandemic probably increased fear among pregnant women. Women are most

71   concerned about their elderly relatives, the health of their children, and then the health of their

72   unborn child. More than half of women experience significant health anxiety [15]. Studies show

73   that pregnant women believe they are more likely to develop a severe infection. Despite many

74   preventive behaviors, most women are still afraid of getting infected [16]. Pregnant women are

75   afraid of both the continuation of pregnancy and the risk of their own life and the need to

76   terminate it as a result of infection. They are also afraid of the transmission of the infection to

77   the fetus, as well as isolation and quarantine [17].

78   Pregnancy is also a period of preparation for childbirth, which for many women is a

79   difficult and even traumatic situation. During a pandemic, fear of childbirth may be aggravated

80   by a change in the course of labor. Women are afraid of the course of labor, complications,

81   threats to their own and their child's health and life, and above all, intense pain sensations [18].

82   We suspect that fear of COVID-19 will be one of the predictors of fear of childbirth. Although

83   there are currently no studies investigating the relationship of these variables. However, it has

84   been shown that the COVID-19 pandemic caused an increase in fear among pregnant women

85   [15,19], and negative feelings, thoughts and emotions during pregnancy, including early

86   pregnancy, influence the later fear of childbirth [20]. Many studies have shown that fear of

87   childbirth is associated with the severity of general anxiety [21,22], and that anxiety as a trait

88   is its predictor [23]. Studies have also shown that support from loved ones is a mediator of fear

89   of childbirth [19, 23, 24], while during a pandemic, family births were banned and women were

90   deprived of this direct support. Therefore, we assume that fear of COVID-19 will be an

91   important predictor of fear of childbirth and a mediator of the relationship between perceived

92   stress and fear of childbirth.

93

94   # Materials and methods

95

96   *Participants & Procedure*

97   262 Polish pregnant women participated in this study. The average age of respondents

98   was 28.40 years. Their exact characteristics are shown in Table 1. Due to the epidemiological

99   threat, the respondents completed the questionnaires via the Internet. The study participants

100   were informed about the anonymity of the study. They could stop filling the survey at any time

101   and without giving any reason. All respondents gave their informed consent to participate in

102   this study. Which was carried following the guidelines of Opole University's Bioethics

103   Committee.

104

105   *Table 1. Characteristics of the studied sample (N= 262)*

106

	M	*SD*	*Min*	*Max*
Age	28.40	3.78	18.00	39.00
Week of pregnancy	31.58	7.09	7.00	42.00
	n		*%*	
Education				
Basic	1		.38 %	
Vocational	6		2.29 %	
Secondary	68		25.95 %	
Higher	187		71.37 %	
Place of residence				
Village	87		33.21 %	
Town (< 100 000 citizens)	73		27.86 %	

City (> 100 000 citizens)	102	38.93 %
Family Childbirth Planning		
Yes	220	83.97 %
No	42	16.03 %
Pregnancy		
First	144	54.96 %
Subsequent – Second	88	33.59 %
Subsequent – Third	23	8.78 %
Subsequent – Fourth	4	1.53 %
Subsequent – Fifth and more	3	1.15 %
Childbirth		
First	171	65.27 %
Subsequent – Second	80	30.53 %
Subsequent – Third	9	3.44 %
Subsequent – Fourth	1	.38 %
Subsequent – Fifth and more	1	.38 %
Chronic Diseases		
No	190	72.52 %
Diabetes	5	1.91 %
Hypertension	6	2.29 %
Cholestasis	2	.76 %
Hypothyroidism	48	18.32 %
Other (unspecified)	23	8.78 %
Trimester		
First	10	3.82 %
Second	36	13.74 %
Third	216	82.44 %

107

108

109 ***Measures***

110   Perceived level of stress was measured with the Perceived Stress Scale (PSS-10) [25].

111 It consists of 10 questions on a 5-point scale. The original version of the scale shows good

112 reliability (Cronbach's α from .78 to .86).

113   Fear of the coronavirus was measured with the Polish Fear of COVID-19 Scale (FOC-

114 6) [26]. It is a 6 item questionnaire. Respondents answer the questions using a 5-point scale.

115 The scale shows good reliability (Cronbach's α=.83)

116   Fear of Childbirth was measured with the Polish Labour Anxiety Questionnaire (KLP

117 II) [27]. It is a 9 item questionnaire. Respondents answer the questions using a 4-point scale.

118 The scale is characterized by acceptable reliability (Cronbach's α=.69).

119

120 *Statistical Analysis*

121   Group homogeneity was analysed with *t*-test and one-way *ANOVA* comparisons. To

122 verify the hypotheses, it was decided to use the correlation analysis and the mediation analysis.

123 The significance of the relationships between variables was tested with Pearson's *r* correlation.

124 The mediation analysis was performed using the PROCESS v3.4 macro [28]. The power

125 analysis was conducted using the G * Power 3.1.9.7 [29].

126

127   **Results**

128 *Group Homogeneity Analysis*

129   Before verifying the mediation hypothesis, it was decided to check whether the tested

130 sample of pregnant women is a homogeneous group. For this purpose, the *t*-test and one-way

131 *ANOVA* were used. The analyses showed that most of the grouping variables did not

132 significantly differentiate the levels of perceived stress and fear of COVID-19. Statistically

133 significant differences in the level of fear of childbirth were be observed for some grouping

134 variables, however, the effect size measures of these differences ranged from small to moderate.

135 Due to the lack of strong effect sizes and large differences in the numbers in individual

136 categories of grouping variables, it was decided to treat the presented group of study

137 participants as homogeneous. More detailed data are shown in Table 2.

138

Table 2. *Results of the t-test and one-way ANOVA group comparisons (N= 262)*

Dependent Variable	Grouping Variable	M	SD	M	SD	t_{260}	p	d_{Cohen}
Perceived Stress	Family Childbirth Planning (Yes ; No)	20.95	8.05	18.76	8.99	1.59	.114	.26
Fear of Coronavirus		23.15	5.68	22.60	5.67	.58	.562	.10
Fear of Childbirth		15.57	5.37	13.48	5.97	2.28	.024	.37
Perceived Stress	Pregnancy (First; Subsequent)	20.10	8.45	21.21	8.45	-1.08	.281	.13
Fear of Coronavirus		23.66	5.13	22.33	5.13	1.90	.059	.26
Fear of Childbirth		16.28	4.98	13.96	4.98	3.47	.001	.47
Perceived Stress	Childbirth (First; Subsequent)	19.97	8.33	21.78	7.96	-1.71	.089	.22
Fear of Coronavirus		23.63	5.22	22.00	6.34	2.23	.027	.28
Fear of Childbirth		16.37	5.06	13.11	5.72	4.74	<.001	.60
Perceived Stress	Chronic Diseases (Yes ; No)	22.47	8.49	19.89	8.04	2.28	.023	.31
Fear of Coronavirus		23.92	4.87	22.74	5.93	1.51	.133	.22
Fear of Childbirth		16.69	5.24	14.68	5.52	2.67	.008	.37

Dependent Variable	Grouping Variable	F	p	η^2_p	Tukey's HSD
Perceived Stress	Education	.74	.529	<.01	-
Fear of Coronavirus		1.24	.294	.01	-
Fear of Childbirth		.37	.769	<.01	-
Perceived Stress	Place of Residence	1.09	.337	<.01	-
Fear of Coronavirus		1.13	.325	<.01	-
Fear of Childbirth		6.48	.002	.05	Towns > Cities & Towns > Villages
Perceived Stress	Trimester	.15	.858	<.01	-
Fear of Coronavirus		2.45	.088	.02	-
Fear of Childbirth		.76	.469	<.01	-

Note: Education – df1=3; df2=258; Place of Residence – df1=2; df2=259; Trimester – df1=2; df2=259;

Correlation & Mediation Analysis

The analysis of the Pearson's *r* correlation showed that there was a statistically significant, moderate, and positive relationship between three tested variables – perceived stress, fear of COVID-19, and fear of childbirth. In the next step, a bootstrapped mediation analysis (5000 samples) [30] using the PROCESS 3.4 MODEL 4 was used [28]. Before performing the analysis, variables were z-scored to obtain Beta coefficients. Results show that fear of COVID-19 was a statistically significant mediator in the relationship between perceived stress and fear of childbirth. More detailed data are presented in Table 3.

150

151 Table 3. *Results of the Pearson's r correlation and PROCESS model 4 mediation analysis (N=*

152 *262)*

Correlation			M	SD	X	M	Y
X – Dependent Variable – Perceived Stress			20.60	8.23	-		
M – Mediator – Fear of Coronavirus			23.06	5.67	.26***	-	
Y – Independent Variable – Fear of Childbirth			15.24	5.51	.47***	.43***	-
Mediation			Beta	SE	p	LLCI	ULCI
X	->	M	.18	.05	<.001	.077	.274
M	->	Y	.32	.05	<.001	.210	.419
X(M)	->	Y	.25	.04	<.001	.178	.326
Indirect Effect			.06	.04	.002	.239	.388

153 *Note: *** p<.001*

154

155

156 *Power Analysis*

157   A post-hoc power analysis using G * Power 3.1.9.7 [29] showed that for a small-to-

158 medium effect size of the presented relationships [f^2=.08] and the significance of *alpha* [.05],

159 the obtained sample was sufficient to obtain a power of [.98].

160

161   **Discussion**

162   The study aimed to determine the relationship between perceived stress, fear of COVID-

163 19, and fear of childbirth in Polish pregnant women during a global pandemic. Analyses point

164 out that the relationship between all tested variables was significant. Perceived stress, fear of

165 COVID-19, and fear of childbirth were positively correlated with each other. Mediation

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166 analysis showed that fear of COVID-19 acted as a mediator between perceived stress and fear

167 of childbirth.

168   Pregnancy is associated with significant emotional stress, which is caused by numerous

169 physiological, physical, and psychological changes [31-36]. During this time, women are

170 concerned about existing medical problems, physical symptoms, changes in the body,

171 childbirth, and the health of their unborn child [37,38]. The present study showed that the level

172 of stress measured by the PSS-10 (20.60) is higher compared to the pre-pandemic result of

173 pregnant women (18) [32]. It is also higher than the Polish population average (16,6) [39]. This

174 is consistent with the results of studies that show that pregnant women experience greater stress

175 compared to people in the general population [32]. Some researchers suggest that stress may

176 occur in up to 75% of pregnant women [1]. Perceived stress is related to the assessment of

177 certain life events as potentially threatening. This perception is related to an individual's ability

178 to deal with such events [40]. The cause of stress and negative emotions can be both

179 environmental factors as well as problems related to pregnancy itself and changes in the body.

180   In addition to factors specific to each pregnancy, important causes of stress include the

181 difficult events experienced during pregnancy, for example, the contagious disease pandemic.

182 Studies have shown that experiencing a natural disaster or a state of emergency during

183 pregnancy contributes to severe emotional distress [2, 41]. Studies show that pregnant women

184 during the COVID-19 pandemic are experiencing moderate to high levels of psychological

185 stress [42-44]. This is likely a result of the social, economic, and health complications that affect

186 pregnant women and their families, as well as uncertainties about the effects of COVID-19 on

187 the fetus [45]. The COVID-19 pandemic has caused fear, anxiety, and stress as a result of the

188 spread of the disease itself, but also because of restrictive measures put to limit community

189 transmission of the virus [14]. COVID-19 restrictions, isolation, and staying at home orders can

190 adversely affect the functioning of pregnant women and increase symptoms of stress [42].

191 Moreover, pregnant women in most countries suffer from significant changes in the

192 management of pregnancy, the course of labor, and postpartum care. Many health services have

193 reduced face-to-face visits and limited medical services to using telehealth [6]. The combination

194 of rapid transmission of SARS-CoV-2 in the community, death rates, and restrictive public

195 health measures can emotionally and mentally overwhelm women during pregnancy. This can

196 cause increased stress, fear, loneliness, and depression, especially for pregnant women, who are

197 additionally burdened with caring for their health and protecting the unborn child [6].

198 Recent research identified two major domains of stress related to the COVID-19

199 pandemic in pregnant women in the US, Poland, Israel, and Germany: stress related to feeling

200 unprepared for the birth due to the COVID-19 and stress associated with fear of COVID-19

201 infection [2, 46]. Both types of stress are related to the severity of the fear of COVID-19. One

202 study found that around one-third of pregnant women during the COVID-19 pandemic

203 experienced stress, both about preparing for childbirth and about the risk of infection. In

204 addition to confirming factors previously established as contributors to prenatal stress, risk

205 factors that are specific to the pandemic have also been identified, including pandemic-related

206 income loss, the belief that someone is infected with COVID-19, and experiencing changes in

207 prenatal care [45].

208 The current study showed that the stress experienced by pregnant women is related to

209 fear of COVID-19. Research shows that pregnant women experience significant fear during the

210 COVID-19 pandemic. Preis et al [2] found that pregnant women experienced a high prevalence

211 of mild, moderate, and severe fear of COVID-19. Other research also found that the COVID-

212 19 pandemic caused an increased fear among pregnant women. Women are worried about the

213 health of their elderly relatives, their children, and their unborn child [15]. One study showed

214 that among pregnant women, more than half of the respondents rated the psychological impact

215 of the COVID-19 epidemic as severe, and about two-thirds reported higher than normal fear

11

216 and anxiety. Almost half of the women reported high fear regarding the vertical transmission

217 of the disease [42]. The research shows that pregnant women are afraid of both the continuation

218 of pregnancy and the risk of their own life and the need to terminate it as a result of infection.

219 They are also afraid of isolation and quarantine [17]. Pregnant women believe they are more

220 likely to develop a severe course of infection and that they can pass the infection onto their

221 unborn child. Despite many preventive behaviors, most women are still afraid of getting

222 infected [16]. Studies showed that many women overestimate the risk of infection during

223 pregnancy [41].

224 Also during the current COVID-19 pandemic, the rules of care for a pregnant woman

225 have changed in many countries. Access to health services was difficult. Prenatal care services

226 were postponed except in compulsory and emergencies, while in some countries pregnant

227 women were only asked to come to give birth. The lack of medical appointments dramatic and

228 rapidly changing information from the media additionally increased fear and uncertainty in

229 pregnant women. These situations affect pregnant women's choices and fears about their

230 pregnancy and childbirth care [19,47]. Not surprisingly, more than 80% of women expressed

231 fear of childbirth during the COVID-19 pandemic [6].

232 In the present study, fear of COVID-19 was found to mediate the relationship between

233 perceived stress and fear of childbirth. Negative feelings, thoughts, and emotions in pregnancy,

234 including the early pregnancy, affect the later fear of childbirth [20]. Pre-pandemic studies

235 showed that fear of childbirth was associated with the severity of general anxiety [21, 22], and

236 that anxiety as a trait was its predictor [23]. It has also been shown that women's experiences

237 related to the fear of childbirth appear to be related to their emotional well-being and symptoms

238 of stress [20, 48]. Also, other studies showed that the risk perception associated with fear of

239 COVID-19 can increase the level of anxiety in pregnant women and mediate the relationship

240 between social support and anxiety. These studies showed that the higher the level of risk

241 perception by pregnant women, the greater the level of anxiety [49]. Several studies have also

242 shown that fear of COVID-19 can act as a mediator between intolerance to uncertainty and

243 psychological well-being [50] and between perceived health status and insomnia, mental health

244 and preventive behaviors [51].

245 Pregnant women during the COVID-19 pandemic experience severe stress because they

246 cannot follow the previously prepared birth plan. Some of them are concerned about whether

247 family members may be present during childbirth. There may also be worried about whether a

248 woman or someone in her family will be in quarantine. Due to this stress, some women may

249 expect a cesarean section. The course of labor during an epidemic is also a cause for concern

250 [17]. Research suggests that a lack of control over decisions related to childbirth can be felt as

251 traumatic. In many countries (e.g. the UK) women are asked to attend all prenatal visits alone,

252 and some countries (including Poland) require to give birth alone, even though familial support

253 during childbirth is considered essential for women's well-being [41].

254 Because of the COVID-19 outbreak, women's expectations of childbirth have

255 completely changed. In the study by Ravaldi et al. [6], fear, sadness, and uncertainty occurred

256 in more than half of the women. During a pandemic, fear no longer correlated with expectation,

257 impatience, joy, and meeting, but with sadness, loneliness, anguish, inability, feelings of

258 isolation, and oppression. Childbirth during the COVID-19 pandemic is perceived by women

259 as a threat to their well-being and health. While preparing for childbirth, women felt a sense of

260 danger, fear, and loneliness. Although the media emphasizes that the restrictions are due to

261 security reasons, this does not seem to be sufficient to alleviate the sense of fear and danger

262 perceived by women who feel isolated from their partner and new prohibitions as immense

263 loneliness [6]. Besides, maternity staff may be lower than usual during the COVID-19

264 pandemic because of reassignment of staff to other areas of the hospital or because of medical

265 workers' infection. Staff may also limit contact with patients for their protection [19, 41, 47].

266   Therefore, many studies indicate the increased fear of childbirth, which is affected by

267   the COVID-19 pandemic. One study showed that 16% of patients underwent cesarean section

268   at the request of the mother [42]. This percentage is much higher than the 5-10% rate reported

269   in the literature [52]. During the COVID-19 pandemic, due to new hospital restrictions,

270   expectant mothers will have to go through higher levels of stress and fear as they will now have

271   to cope alone as no spouse or companion is allowed to be in the delivery room to support them

272   [6]. Studies have shown that support from loved ones is a mediator of fear of childbirth [24],

273   while in the COVID-19 pandemic, family births were suspended in many countries, and women

274   were deprived of this direct support. Fear and lack of support were predictors of fear of

275   childbirth [22, 35, 53]. It has been shown in the literature that the support of the partner, mother,

276   other family members, and friends of the pregnant woman in the perinatal period is important

277   in reducing stress and fear [47]. Among the human rights relating to pregnancy and childbirth,

278   the WHO recognizes the importance of companionship in childbirth, freedom of delivery

279   positions, keeping mothers and their babies together after birth, and promoting breastfeeding.

280   Unfortunately, in many places around the world, the pandemic has drastically changed care for

281   women and children [6].

282   The presented study provides new and relevant data. However, it is not free from

283   limitations. A tested mediation model may suggest causal relationships. The mediation analysis

284   is only a complementary tool that does not allow to determine the cause and effect relationships.

285   To verify such relationships, a longitudinal study should be carried out. The presented results

286   are based on the Polish population. International research should be carried out to verify the

287   significance of the proposed model. This would additionally require the use of the cultural

288   equivalence analysis to compare various cultural groups.

289   *Conclusion*

14

290 From current research it can be concluded that the COVID-19 epidemic may have a

291 negative emotional impact on pregnant women, causing fear and stress. Our results show that

292 fear of COVID-19 was a mediator in the relationship between perceived stress and fear of

293 childbirth. It is also worth paying attention to the fact that strong negative emotions that appear

294 during pregnancy may cause and increase pregnancy symptoms and pregnancy complications,

295 and may affect the mother's well-being, the course of pregnancy, and the child's condition.

296 Many studies have shown that high levels of perceived stress and fear during pregnancy are

297 associated with several negative health consequences such as pregnancy complications,

298 miscarriages, preterm labor, low birth weight, postnatal depression, and negative

299 developmental outcomes in infancy [54-57]. Therefore, it is especially important to support a

300 woman in the perinatal period and to enable her to give birth to a companion. It can be assumed

301 that this will be a factor that will significantly reduce the fear of childbirth during the COVID-

302 19 pandemic.

303

Abbreviations

305 COVID-19 - coronavirus disease 2019; SARS-CoV - severe acute respiratory syndrome

306 coronavirus; MERS-CoV - Middle East respiratory syndrome coronavirus; PSS-10 - Perceived

307 Stress Scale; FOC-6 - Fear of COVID-19 Scale; KLP II - Labour Anxiety Questionnaire;

Ethics approval and consent to participate

309 The presented study was in accordance with the guidelines of the Bioethics Committee of the

310 University of Opole (no number assigned due to the Committee's internal legal acts). Written

311 informed consent about the participation in the study was routinely obtained from all study

312 participants.

Consent for publication

Not applicable.

Availability of data and material

The data can be available from the corresponding author on the reasonable request.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

JD conceived and designed the study and wrote the first and final draft of the manuscript. RG analyzed the data and wrote the final draft of the manuscript. AI designed the study and collected the data. MB supervised the research project and wrote the final draft of the manuscript. All authors have read and approved the manuscript.

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